

by the use of iron ballast and iron tanks, of iron knees, iron cables, and above all, of iron capstans, besides various other articles made of the same material, forming altogether a very large and powerful magnetic mass.

The direction and intensity of the deflecting forces thus produced, vary in different latitudes and on different sides of the equator; being greatest in the highest latitudes, where the dip is considerable, and when the ship's course is east or west: and in high southern latitudes, being the reverse of what it is in high northern latitudes. In His Majesty's ship Gloucester, which may be taken as an example, the deviation of the compass in the east and west points was found to be, in the British Channel,  $9^{\circ} 30'$ : so that after running ten miles, the vessel would be more than a mile and a half to the southward of her reckoning, and so on in proportion as the distances increased. An error of this magnitude, occurring in a narrow channel and in a dark night, were it unknown or disregarded, might lead to the most fatal consequences; and the disaster might perhaps be erroneously ascribed to the prevalence of a powerful current, the existence of which was before unknown.

The Thetis sailed from Rio Janeiro, in December last, with a million of dollars on board, in the finest weather, directing her course to the S.E. The next day, thinking they were clear of land, they tacked, and were sailing at the rate of nine knots, when the first intimation they had of being near land, was the striking of the jib-boom against a high perpendicular cliff, which broke the bowsprit short off, and sent all three masts over the side; thus in a moment bringing utter destruction on this fine vessel and her valuable cargo. The author shows that the deviation of the compass arising from the attraction of the vessel, was exactly of the kind which was likely to occasion this great mistake in the ship's reckoning: for the distance run by the Thetis being about eighty miles, if the local attraction of the vessel had been equal to that of the Gloucester, she would have passed five miles nearer to Cape Frio than her reckoning,—an error quite sufficient to account for the fatal catastrophe. The author hence infers the importance of bestowing more attention than has hitherto been given to the influence of the local attraction of vessels, and to the application of the proper means of correction.

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April 28.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G.,

President, in the Chair.

James Henderson, Esq., His Britannic Majesty's Consul at Bogotá, was elected a Fellow of the Society.

The following Presents were received, and thanks ordered for them:—

Mémoires de l'Académie Royale des Sciences de l'Institut de France. Tome X. 4to.—*Presented by the Academy.*

Abhandlungen der Königlich Akademie der Wissenschaften zu Berlin. Aus dem Jahre 1827. Nebst der Geschichte der Akademie in diesem Zeitraum. 4to.—*The Academy.*

The Athenæum Journal of English and Foreign Literature, Science, and the Fine Arts. Nos. 166–182. (Jan. to April, 1831.) 4to.—*The Editor.*

A paper was read, “On the Anatomy and Physiology of the Minute and Capillary Vessels.” By Marshall Hall, M.D.

The author, considering the minute blood-vessels as *arteries* or *veins*, as long as their subdivisions or junctions are attended with a change in their dimensions, denominates them *capillaries* when no such change occurs. With the aid of an achromatic microscope of Dollond's, he endeavoured to ascertain what differences existed between the systemic and pulmonary circulations, as far as regards these vessels. Dr. Edwards had observed that the batrachian reptiles are speedily killed by immersion in hot water : and the author found that although by plunging any of the animals of that order into water at 120° of Fahrenheit they are speedily deprived of all power of sensation and of motion, yet the action of the heart continues for a very long time, thus affording an opportunity of leisurely observing the phenomena of the circulation, without the infliction of pain, and without any disturbance from the struggles of the animal.

In the fins and tail of the stickleback, the number of the capillary vessels is small, and their distribution simple : the artery runs along the border of each ray till it reaches the extremity, when it is reflected, and becoming a vein, pursues a retrograde course by the side of the artery. This simplicity in the mode of its distribution corresponds with the simple nature of the function of the part, which is merely an instrument for swimming. In the web of the frog's foot, which is adapted to a greater variety of mechanical purposes, the system of blood-vessels is somewhat more complex ; the capillaries are more abundant ; the arteries, which are nearly equal in number to the veins, pursue a more direct course ; and the veins are larger and more tortuous. No pulsatory movement can be perceived in the blood while moving in the capillaries or veins, as long as the circulation is unimpeded and in the natural state. The author was unable to detect any anastomoses between the minute arteries, although they are frequent among the veins, where they give rise to occasional oscillations in the currents of blood flowing through them : neither could he discover any instance, in the web of the frog, of the immediate termination of an artery in a vein. The velocity of the blood is retarded immediately in its passage from the arteries into the capillaries, because the united capacity of the branches is greater than that of the trunk which divides to form them. In the mesentery of the toad, the distribution of the vessels is simple, like that of the fins and tail of a fish.

But in the pulmonary organs, where the purpose to be answered is that of diffusing the blood over the greatest possible extent of surface, the arteries and the veins correspond to each other in all their ramifications, and their adjacent branches generally pursue courses parallel to each other. Their transition into capillaries is effected with fewer subdivisions than in the case of other arteries. No disposition exists among these arteries to form anastomoses with each other, or with the veins; but the intervening spaces are uniformly occupied by a close network of capillary vessels. The lung of the salamander is simply vesicular; that of the frog is cellular, as well as vesicular, and consequently presents greater difficulty in following with the microscope the course of the vessels as they traverse membranes situated in different planes. In the lungs of the frog, the larger vessels pass chiefly on the external surface; but in the toad they follow the course of the internal margins of the vertical meshes. The author concludes from his observations, that the capillaries, properly so called, have no power to contribute to the motion of the blood, and that the capillary circulation depends altogether upon the action of the heart and arteries. In cases of impeded circulation, he observes, the pulsatory movement of the blood may be seen, not only in the arteries, but also in the capillary vessels, and even in the veins.

At nine o'clock, pursuant to the Notice sent to the Fellows according to the Statutes, a ballot was taken for filling three vacancies in the Council occasioned by the resignation of Viscount Melville, K.T., Sir George Murray, G.C.B., and Sir Robert Peel, Bart. Dr. Goodenough and Sir Robert Inglis were appointed scrutators. After examining the Balloting Lists, they reported that John Frederick Daniell, George Dollond, and Charles Konig, Esqrs., were elected Members of the Council.

A Letter from Sir James South to the Treasurer was read, stating, that the Dome of the Building intended for his large Equatorial was nearly completed, and that he would be happy to show it to the Members of the Society any day of the week, between the hours of one and five.